
JUPITER & SATURN,

Now visible in our Hemisphere

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JUPITER & SATURN,

Their APPEARANCE in the Heavens,
And INFLUENCE on the Earth;
Being an accurate DESCRIPTION of
THOSE TWO SUPERIOR PLANETS,
Now visible in our Hemisphere.

WITH REMARKS,
Proving their late and present Effects on our
Atmosphere.

TO WHICH ARE ADDED,
Concise and easy Directions for viewing
them every clear Night, either with the
naked Eye or Telescope.

A L S O,
The Phenomena of the Harveſt Moon and
other Heavenly Bodies, upon the Principles
of SIR ISAAC NEWTON.

By the Author of The New Introduction to
the Knowledge and Use of Maps.

"STARS TEACH AS WELL AS SHINE."

L O N D O N :

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FRIDAY & SATURDAY

THESE ARE THE DAYS OF THE WEEK
WHICH ARE THE MOST FAVORABLE
FOR THE SALE OF THE GOODS
AND THE MOST CONVENIENT
FOR THE CUSTOMERS.



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P R E F A C E.

THE Author's desire is to render this little Treatise as entertaining and useful as possible — many abstruse technical terms are therefore intentionally omitted — and has endeavoured to substitute in their place plainness and perspicuity, wishing it were possible to render a knowledge of the heavenly bodies as clear to every rational mind as the Great Author has rendered them conspicuous to every human eye. The utility of
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those researches are too obvious to require enlargement; for, whatever tends to improve the mind and mend the heart must be beneficial to society—especially at this day, when the temper of the age seems more inclined to invitation for improvement or amendment, by methods easy, pleasant, and novel, than by more close reasoning or dry precepts. It is therefore hoped this small Tract will tend to prove, *That Divine philosophy is not harsh and crabbed, as dull fools suppose; but sweet and musical as is Apollo's lute.*

CHAP.

C H A P. I.

The present Appearance of those two superior Planets SATURN and JUPITER, with their Situation in the Heavens, and Directions for easily discovering them, so that they may be viewed to Advantage every clear Evening, either by the naked Eye or Telescope.

THOSE who wish to entertain themselves with the most pleasing and rational of all inquiries, THE PHENOMENA OF THE HEAVENLY BODIES, will find our hemisphere at this time highly worthy of their attention, and more particularly adapted, not only to gratify the philosopher, but also those of genius and taste of every

class. This small treatise, being more immediately intended for those who are not proficient in the science, and to render it easy to such, explanatory notes are added, which, it is presumed, will render the work facile and comprehensive to ladies and young minds (as well as others) who, by being partakers, will receive at least entertainment, and, by permitting their thoughts to extend towards the GREAT FIRST CAUSE, will find a much larger field for refined and rational researches.

The curious phenomena which now claim our attention are the appearance of two of the superior planets in our system. They are apparently near each other, almost on a line, and may be seen every clear evening towards the south, a little after sun-set, and not very high above the horizon. These planets are called Saturn and Jupiter, and will
not

not for many years be in the same position again. Jupiter, being nearest to us, appears largest and brightest, and Saturn, from his vast distance, appears the least, though in reality the biggest. When an observer views them, he must look towards the southern part of the heavens, then Jupiter will be on his right hand, and Saturn on his left. It is worthy of observation, that, after sunset, Jupiter will make his first appearance, and shortly after Saturn will be discovered---for Saturn's vast distance requires a greater diminution of twilight before he can be rendered conspicuous. A more particular description of these two planets will be given hereafter. At present, we shall endeavour to describe their accurate situation in the heavens, and their progression, that those who are furnished with telescopes may view them to advantage, and others may know how to distinguish them, and mark their

progreſs with the naked eye. But it is not meant to trouble the reader with a parade of technical terms, nor even to mention right aſcentions, culminations, equations, aphelion, apogee, azymuths, &c. &c.---the aſtronomer is ſufficiently acquainted with thoſe terms and their proper application. It therefore is the buſineſs of this treatiſe to be familiar to every rational capacity.

Towards the beginning and middle of the preſent month of Auguſt, 1782, about 4 o'clock in the afternoon, Saturn and Jupiter will riſe (nearly ſouth-eaſt, making their apparent progreſs towards the ſouth) but will not be viſible till near 8 o'clock, that is, after ſun-ſet*; at which

* The ſuperior light of the ſun diminiſhes all leſſer lights in his hemisphere, rendering the ſtars and planets inviſible.

which time, if the night is clear, those beautiful planets will make their serenely * bright appearance, and will be full south.

I have

For all the stars in our splendid firmament shine equally by day as night, and are hid only from us by the more brilliant and powerful rays of the sun; as may be observed in a lighted candle, when held in the sun beams the flame of the candle is not seen. So stars and planets are rendered invisible by the brightness of the sun. It is said that a spectator, placed at the bottom of a very deep well, would see the stars at mid-day, because the vast depth of the well would exclude the sun-beams from his sight.

* We say serenely, because (as will be further explained) planets shine with a more serene and steady light than stars, and

I have mentioned the largest and most brilliant on the right hand to be Jupiter, and

and this is one principal rule for distinguishing planets from stars. Planets shine like our moon, with an even steady calm light, but stars twinkle, glitter, and emit a vivid lustre, never seen in planets. Thus an inhabitant of the planet Jupiter—(for we have every reason to believe the planets are inhabited, both from philosophy and religion). Philosophy proves to us that our earth is a planet and the moon her attendant; the scripture mentions plurality of worlds—the psalmist says, “WHO HUNG THE WORLDS UPON NOTHING”)—An inhabitant of the planet Jupiter, on viewing our earth, it would appear as a planet in the heavens, and our sun as a star. As Dr. Young beautifully expresses it, “One sun by day—By night ten thousand

and the smaller, on the left hand, to be Saturn. They will be near the horizon, not more than 15 degrees above it, and almost in a straight line with each other, except when they are about setting; then they appear in an oblique direction, occasioned by the arch or bend of the

and shine to light us deep into the DEITY!" The fixed stars are conjectured to be each a sun to light some particular system; and each planet that we see, a world, illumined by the same sun that warms, matures vegetation, and enlighens our hemisphere, affording us (as also with many other nations and worlds) infinite benefits, without any diminution of his own power, and so impartial, that every nation and kingdom enjoy, in the course of the year, an exact and equal share of his light and bounty, and the heat properly regulated for the advantage of each climate.

ecliptic.

ecliptic. Jupiter sets and rises first. They appear not more than two yards distance, though in reality they are 5 degrees, 25 minutes, or 325 English miles apart. But towards the latter end of October they will be much nearer each other, as will be shewn by the following calculations. They set about 12 o'clock at night. These positions will not materially vary for a week or more.

But on August the 16th, the moon enters her first quarter, and will be very near those planets, approaching still nearer on the 17th, and on the 18th will have past them. During this time the planets appear small and faint, occasioned by their vicinity to the moon, whose brightness will take somewhat from them, as neither stars nor planets appear so large and brilliant when the moon is above as when beneath our horizon. But the moon will
serve

serve at this time as a guide to direct the stranger where to discover Jupiter and Saturn: for, between 7 and 8 in the evening, on the 17th, the moon will be almost directly beneath Jupiter, and altogether in the south; and had the moon been a quarter of a degree north latitude (instead of almost 5 degrees south latitude) she would, about 12 o'clock at night, have eclipsed Jupiter, by opposing herself betwixt us and that planet; yet it must have been invisible to us at that time, as both planets would be beneath the horizon. We have thought it necessary to add several calculations, for, should the weather prove cloudy and prevent some of the observations from being seen, more are inserted, that the reader may not be disappointed in his researches, nor the telescope unemployed.

August 27. About this time, for several nights, Saturn and Jupiter will
rise

rife nearly south-east at 3 o'clock in the afternoon, and will be very conspicuous in the south about 7 in the evening, appearing in a straight line with each other, till towards 11 o'clock, when they will set in an oblique direction, for reasons before given. Yet although these planets at this time are set to us, they will be just rising to the inhabitants of the Mogul islands, and various other parts of the world; and at the very time they are rising to our hemisphere, they will be seen setting or declining below the horizon of many other nations.

After the 28th of August, for several nights, there will be little or no moon during the time these planets are above the earth; so that should the weather permit, they may be conveniently viewed, either by the naked eye or glasses. And, by a good reflecting or acromatic telescope, may be discovered

Jupiter's

Jupiter's moons and belts, Saturn's ring and attendants, with the whole admirable furniture of those celestial bodies.

August 31. If a clear evening, the moon will be seen rising north-east about 10 o'clock, just as those planets are setting in the south-west; so that the best time for observation on this night will be between 7 and 8 in the evening; and again, for a few nights, they will be very conspicuous, as the moon will not rise till after those planets are set.

September 11. Jupiter and Saturn rise about half past 2 in the afternoon, and will be conspicuous near the south about 7. The moon at this time will set before those planets, consequently, about 8 will be the best time for observing them. The moon, on this night will appear at some distance on the west of Jupiter and Saturn. On the ensuing
C night,

night, the moon will approach nearer them, and the two following nights, the 13th and 14th, will be very near; and on the 15th, the moon will have passed them, and appear on the other side (that is, the eastern side of them) and will not set till after Saturn and Jupiter. We thus have ocular demonstration how much swifter the moon's motion is than Jupiter or Saturn's, for, in the course of a few days, we shall see the moon pass from one side to the other of these planets.

September 23. The sun enters the sign called Libra; and here it is that the sun passes the equator, making equal day and night all over the world. Saturn and Jupiter will now rise about half past one, but will not be discernible till after 6 o'clock. They set about 9, when the moon will be far advanced above the eastern horizon. This is what is called
the

the harvest, or hunters moon; for the harvest moon and hunters moon are the same, being the moon whose full happens either upon the autumnal equinox or near it, whether before or after it. She rises nearly at the same hour, that is, within a short time before or after the setting of the sun. Our present harvest moon riseth about half an hour after sun-set, and will continue for three nights to rise nearly within that time of the setting sun; by which phenomena or appearance, the whole hemisphere becomes enlightened, first by the sun, and then by the moon, which not only make the nights pleasant but profitable, by enabling the farmers to get in their corn-harvest----hence called the harvest-moon; and because the season for hunting happens about this time, it is called the hunters moon; as also, because shepherds formerly, for the better management of their flocks, were content to

lie abroad on those nights, it was called the shepherds moon.

October 1, 1782. Jupiter and Saturn rise at one o'clock, and will be very conspicuous in the south-west a little after 6. They set between 8 and 9 o'clock.

October 11. About half past 6 in the evening, the moon and planets will be near each other, the moon, having 5 degrees south latitude, will appear beneath them, forming a kind of triangle. But during the night, the moon will pass those planets, and appear the next evening at a small distance from them.

October 25. Jupiter and Saturn rise at 11 in the forenoon, and may be seen near the horizon, in the south-west, at half past 5, or 6 o'clock. They set between 7 and 8. The moon will rise nearly

nearly opposite about the time of their setting, and the planets will be much nearer to each other than in the month of August.

November 1. These planets have now approached so near the sun, that they will only be visible about half an hour after sun-set, when they will be seen but for a short time, about that part of the heavens where the sun went down. They will be seen a few nights in this direction, or till about the middle of November, when they will have approximated so near the sun as to be totally invisible, until about the last day of the year, December 31, 1782, when, instead of evening, they will become morning stars, and may be seen rising in the south-east, just before the sun, about 7 in the morning, and very near the horizon; but they will not be visible more than half an hour in a day, and

that will require particular attention to the above time. Both these planets are in the sign called Sagittarius.

About the middle of January, 1783, Saturn and Jupiter may be seen nearly south, at half past 7 in the morning. At this time they rise at 7, and set at two in the afternoon, but can only be seen a short time before sun-rise. They continue now morning-stars, or, as astronomers term it, they rise HELIACALLY; that is, when after any star or planet has been in conjunction with the sun, and on that account invisible, it gets at such a distance from him as to be seen in a morning before sun-rising, when the SUN, by his apparent motion, recedes from the STAR towards the EAST. But what is called the heliacal setting is, when the sun approaches so near a star that it hides it with his beams, and keeps the fainter light of the star from
being

being perceived. The heliacal rising and setting, therefore, is rather an apparition or oculation, than a rising and setting.

The above calculations are not laid down to strict astronomical accuracy, or particular minutes of a degree. It would be tiresome to the reader, and unnecessary, as they will be found, upon a general medium, sufficiently to correspond with the face of the heavens, so as fully and clearly to direct the attentive observer.

Having thus traced our calculations as far as the sun at present permits; for, when any planet is near the sun, it becomes not only invisible to us but to the whole world. The superior splendor of that great luminary diminishes the smaller lights. The progress of those two superior planets having been shewn,
it

it may not be improper, in this place, to give some description of the planets themselves.

N. B. The situation of Jupiter, Saturn, Mars, and Venus, their oculations and appearances, with methods for more easily and accurately viewing those planets and other curious phenomena of the heavenly bodies, for the year 1783, and beginning of the year 1784, is now at press, and will shortly be published, price 1s. It is of the size to bind up with this, so as to form one complete pocket-volume. In this Treatise will also be explained the Source of Attraction, Phenomena of the Tide, with some remarks, proving the planets to be habitable worlds, deduced from Nature, Reason, and Religion, as also from some new and very important discoveries.

CHAP.

C H A P. II.**Of SATURN.**

SATURN is the largest and most remote planet in our system. He revolves round the sun from **WEST** to **EAST** in his direct motion, but, in his retrograde motion, from **EAST** to **WEST**. He performs his course with no less than five attendants or moons, which are not to be seen but by the help of a very good telescope. Besides these attendants, Saturn has an ornament peculiar to himself, for he is dignified with a vast **LUMINOUS RING**, which surrounds his middle, and does no where touch his body, but, by an exact libration and equipoise of all its parts,

parts, sustains itself like an arch, and, being thus suspended by Heaven's geometry, is kept from falling upon his body. The breadth of this ring is computed to be 21,000 miles, and at such a distance from the body of Saturn as is equal to its breadth. This space is so great between the body of Saturn and his ring, that, in a proper situation, we can see the heavens and stars through the same. The purpose of this admirable ring seems, from its lucid appearance, intended by Providence to supply Saturn with light, and make up for the deficiency of the sun's rays, which must lose much of their power in passing through such an immense tract to this planet (the distance of Saturn from the sun being ten times greater than that of the earth from the same). Therefore, the warmest regions in SATURN, even under his equator, are much colder than our FRIGID ZONE, for, to an inhabitant of Saturn, the

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the sun would not appear much bigger than Sirius or the Dog Star, consequently its light and heat will be diminished in the same proportion.

C H A P. III.

Of JUPITER.

JUPITER is a very large and beautiful planet, hath four attendant moons which circulate round him, exhibiting the same phases and figures that our moon shews us. When they are in opposition to the sun, they appear to Jupiter bright and full; from thence receding, they assume a gibbous shape; when they come to a quadrantile aspect, they look like half moons; before the conjunction, they shew themselves in horned figures; and when they come to be joined in the same

same line with the sun, they totally disappear. These four moons were first discovered in Italy, in the year 1610, by GALILEUS, an Italian astronomer. This planet has also a phenomenon peculiar to himself, i. e. three girdles or zones, commonly called Jupiter's belts, which, through a telescope, make a very pleasing appearance. According to Sir Isaac Newton, they are formed in his atmosphere, in which are several spots. From the motion of which the rotation of Jupiter round his axis is said to have been determined. The day and night of Jupiter are very near the same length all over his surface, that is, 6 hours each, except at his poles, where it is continual day. Jupiter's distance from the sun is above five times as great as that of the earth from the sun.—In the year 1665, M. Cassini discovered a very large spot on Jupiter's disk, which he observed continually for the space of two years, and

and determined accurately its figure and position in respect to his girdles or belts; but this spot vanished in the year 1677, and was not again seen till the year 1679. Afterwards, for the space of three years, it continually shewed itself, and then by degrees withdrew from our sight, and has since several times appeared and disappeared. In a word, from the year 1665, when it was first observed, to the present year 1782, it has sixteen times appeared, and vanished. By its revolutions we conclude, that the body of Jupiter moves round his axis in the compass of 10 hours. By the eclipses of Jupiter's moons we are able to give a solution of a problem, which is one of the most noble and curious in natural philosophy, and can scarce fail to raise our wonder and amazement; that is, WHETHER LIGHT TAKES UP TIME IN COMING TO US, OR WHETHER IT IS PROPAGATED TO US IN AN INSTANT? Now these

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eclipses

eclipses shew and prove that LIGHT is not propagated in an instant—but takes up time in coming to us—(though a very short time.) It comes to us from the heavens with a prodigious quick motion and incredible celerity. The velocity of light is such, that it reaches us here from the sun in the space of 11 minutes, though the sun's distance from us is computed at near 80 millions of miles. Astronomers discovered this motion of light by observing the eclipses of Jupiter's moons: for, when the earth, in its orbit, was at its nearest distance from Jupiter, the eclipses were found to happen sooner than they did, when they were observed at the earth's greatest distance, where they fell out sensibly later than they ought, according to our astronomical computations. These quicker and slower returns of eclipses having been observed for many years with much care and diligence, enables us to establish

blish this argument for demonstrating the successive propagation of light; and by them is proved, THAT LIGHT, LIKE ALL OTHER BODIES IN MOTION, HAS A DETERMINED DEGREE OF VELOCITY, AND TAKES A DETERMINED TIME TO MOVE THROUGH A GIVEN SPACE.

By the ECLIPSES OF JUPITER'S MOONS we have another very important advantage, of the utmost consequence to our fleets, and to every commercial nation, viz. a method of finding the longitude by them; for, when those eclipses are observed in different places of the EARTH, the longitude of places are, by such observations, determined. Longitude means the distance we are, east or west, from any particular country or place. Latitude means our distance from any place, either north or south, which is easily discovered by the height of a

Star called the North Pole, or in the south by some of the southern constellations, &c. But as the method of finding the longitude is not in general understood, we shall therefore give a short explanation of

LONGITUDE.

The sun is a fixed body, and the earth, by its rotation on its axis, brings every inhabitant on its surface, once in twenty-four hours, under the meridian * line on which the sun is, making it noon (or 12 o'clock) to every nation, when under this meridian line :---Thus, as the earth turns towards the east at the rate of 15 miles in a minute, all eastern nations will have the sun first on their meridian, and, from the time they have past the meridian to the time we (being more west) arrive at it, turned into degrees, will

* The name of meridian is from the Latin MERIDIES, which signifies mid-day.

shew the difference of longitude between us and them :—Thus, by an ephemeris, or any accurate calculation, taken at London, it appears that there will be an eclipse of * one of Jupiter's moons at 2 o'clock in the morning. Suppose an observer at sea, having been driven out of his course, and knows not where he is, examines and sees this eclipse by his telescope, but on looking at his watch † finds it only one o'clock, he therefore knows he is one hour eastward from London, and that an hour in time is equal to 900 miles, so that he is in 15 degrees EAST longitude, or 900 miles

* Jupiter, having four moons, occasions the eclipses to be very frequent, consequently more useful to the purpose of longitudinal observations.

† This shews the utility of a correct time-keeper, for every minute the watch should be wrong will be equal to an error of 15 miles.

east of London. Had the watch, instead of One been Three o'clock, it would have proved the ship to have been 15 degrees west longitude, because all inhabitants 15 degrees west of London have their mid-day, or sun in their meridian, one hour later, and all inhabitants 15 degrees eastward have their noon one hour sooner than London.

C H A P. IV.

The Influences of SATURN and JUPITER.

IT is certain, that all the superior heavenly bodies have a powerful influence on our earth. We have ample proof of this in the known influence which the moon has on our tides. That
silver

silver orb attracts the vast ocean at her new and full. Not only the waters but the human species feel her powerful effects; hence maniacs are always considerably affected at her change. The changes of this planet are often known to alter the weather, which frequently operate with acute influence on the humours of the human body. Thus, alteration of weather is felt by old people, and valetudinarians, whose nervous habit, with rheumatic and other aches, render them true but painful barometers that prove very sensibly the effects of influence. The powerful influence of that flaming orb the sun * is acknow-

* A Greek stoic that used to deny the sun's influence, once fell asleep in his garden, the philosopher Gassendus, with a burning glass, set the stoic's beard in a flame, when he never after denied the sun's power.

ledged

lodged and felt by all created beings.
 It is by the influence of this great luminary that all our harvest and fruits are ripened; that the noxious damps of the earth are exhaled; that the moon affords us light; that the tender young of every kind are cherished. Infinite is the power and utility of this glorious orb! Infinite is the goodness of the GREAT CREATOR, "who bindeth up ORION and sheddest abroad the sweet influence of the PLEADES, who sendeth us our times and our seasons, and who tempers the wind to the shorn lamb." The influence of the sun also in many cases tends to the preservation of health. Its genial warmth relaxes and opens our pores, discharging through these eliminative ducts such secretions that otherwise would prove prejudicial to the human body.

If it is therefore allowed that the
 sun

sun and moon have their influences on the earth, it will not be difficult to demonstrate that those two superior planets, Saturn and Jupiter, who are within our system, have likewise their influences. When we speak of the earth, we also mean the air and atmosphere which surround it. The air in which we live and breathe is extremely susceptible and easily influenced by any present or foreign matter. Odoriferous flowers, and the blossoms of various herbage, will refresh and render the air salubrious, while, on the contrary, disagreeable fumes, putrefactions, effluvia of animals, &c. will taint and infect the air, rendering it pestilential. The spring and weight of the air are likewise so sensitive, that even small degrees of heat will sometimes alter its equilibrium, and enable it to produce earthquakes and other of the most vehement commotions of

of nature *. Seeing then the air thus easily disturbed, and so apt to receive impressions and attractions from slight

* Milton seems of the same opinion with Sir Isaac Newton and other eminent philosophers, that the planets are not only habitable worlds, but that they reciprocally influence each other.

“ What if that light
Sent from her thro’ the wide transpa-
rent air,

To the terrestrial moon be a star
Enlightning her by day, as she by night
This earth? reciprocal, if land be there,
Fields and inhabitants: her spots thou
seest

As clouds, and clouds may rain, and
rain produce

Fruits in her fosten’d soil, for some to eat
Allotted there; and other suns, perhaps,
With their attendant moons, thou wilt
descry,

Communicating male and female light;
Which two Great Sexes animate the
world.”

causes,

causes, are we to doubt that those vast bodies of Saturn and Jupiter, each larger, much larger than the earth, should affect us with their influences, especially when they are in such aspects * that their united rays fall fully and forcibly upon us? Dr. Mead says in his excellent treatise concerning the influence of the sun and moon, that the other planets have likewise their peculiar influences, which, though inferior to the sun and moon, yet contribute various ways towards increasing or diminishing the action of those on the earth and human bodies. And these united forces are of such consequences, that violent and occult diseases with which whole nations are seized, may be certainly attributed to

* Aspects are an angle formed by the rays of two planets meeting on the earth, which is able to excite some material power or influence.

them.

them. And the SOMEWHAT DIVINE of Hippocratis, which he recommends to have regard to in diseases, is most probably nothing more than the state of our atmosphere, occasioned by the influence of the planets.

Dr. Goadby also, in his Meteorologia, has carefully examined the face of nature for several centuries back, and indubitably proves the influence of Saturn and Jupiter on the earth. Their conjunctions, he observes, very seldom happen but when they do, their effects are (especially from some aspects, whence they send forth an unknown vital substance) most severely felt. On an opposition of those planets, he mentions such inundations, that numbers of people, whole herds of beasts, and flocks of sheep, were drowned, as also hurricanes, &c. with much sickness. Another conjunction, many years after, occasioned

sioned terrible storms, thunder *, lightning, tremors of the earth, and violent hail

* Milton, in his *Paradise Regain'd*, thus finely describes that tremendous effect of nature, a thunder-storm :

“ And either tropic now
'Gan thunder at both ends of heaven.

The clouds
From many a horrid rift abortive pour
Fierce rain with lightning mix'd, water
and fire
In ruin reconcil'd : nor slept the winds
Within their stony caves, but rush'd
abroad
From the four hinges of the world, and fell
On the vex'd wilderness, whose tallest
pines
Tho' rooted deep as high, and sturdiest
oaks
Bow'd their stiff necks, loaden with
stormy blasts
Or torn up sheer---Then fell the fiery
darts,” &c.

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The

hail storms in July, and the people afflicted with dangerous diseases.—Again,

The storm having discharged the atmosphere of its violent active principals, the calm morn is thus described :

“ Thus pass’d the night so foul, ’till
morning fair

Came forth with pilgrim steps in amice
gray,

Who with her radiant finger still’d the
roar

Of thunder, chas’d the clouds, and laid
the winds.

And now the sun, with more effectual
beams,

Had clear’d the face of earth, and dry’d
the wet

From drooping plants, or drooping trees.
The birds,

Who all things now behold more fresh
and green,

After a night of storm so ruinous,
Clear’d up their choicest notes in bush

and spray,

To gratulate the sweet return of morn.

he

he mentions another conjunction of those planets, which occasioned such inundations, that the roads were all overflowed, and carriages were stopped on their passage to London for several days, with almost every person ill; and any died. In the above treatise the curious may not only satisfy themselves of the exact years and months when those eminent conjunctions and oppositions happened, and their effects, but also their situations in the Zodiac, and signs they were in. These things being universal, we are not to be surprised at the effects we have at this time experienced from the influence of those planets, to which is attributed the late influenza in May last, which affected, more or less, all degrees of people, and nearly all countries. So prevalent was this sickness, that the streets in London were almost destitute, some being confined by illness, others through fear of catching the INFLUENZA, which was

E 2 epidemical

epidemical. Even the playhouses were obliged to shut up, for two reasons, illness of their performers, and want of company;—an instance never before known. And the papers afforded us every day fresh instances of the havoc it made abroad. The air appeared as phlogisticated, by influences or vapours emitted from some adverse foreign body; and all dephlogisticating aids proved most salutary in this disorder. Those planets were then nearer to each other than at present, being within less than three degrees of each other, in the sign Sagittarius. The atmosphere seems to have felt their influence, as is evident, from the unsettled weather which we have experienced. Such vicissitudes of great heat, succeeded by inundations of wet, hail-storms in the summer quarter, with tremors of the earth, resembling an earthquake, which was sensibly felt about the

the middle of July, at Maidenhead in Surrey, and the adjacent parts *.

From the above remarks, there scarce remain a doubt of the influence of these planets. Hippocrates advises his son Thessalus to the study of numbers and geometry, because, says he, the rising and setting of the stars have much influence on the earth, and great effect on distempers. Hence it is that, in the Dog Days, we feel a kind of sultry heat, attended with a languor and faintness, occasioned by the rising of Canicula, or the Dog Star, which is a star of the first magnitude, the largest and brightest of all the stars in the heavens, and whose

* The influence of these planets is now much abated, because, being nearer the horizon, part of their rays fall under the earth; nor is their duration so long in our hemisphere.

rays at this time (from the beginning of July to the middle of August) being blended with the sun's, operate with a strong influence on the earth, so as to considerably affect our atmosphere and the healths of many. Hyppocrates and Pliny tell us, that the day the Canicula rises, the bile increases, and the human bodies are inclined to fevers, dysenteries, &c. from the influence of this star. Ephestion says, that from the aspect of Canicula, its habit and colour, the Egyptians drew prognostics concerning the rise of the Nile, so that the first rising of this star was yearly observed with great attention.

About the beginning of February, 1783, this large brilliant star will rise towards the south-east, and be conspicuous near the horizon, especially about 10 o'clock, when it will be higher in the heavens, and almost full south. At this time of
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the year (i. e. February) Canicula is above the horizon all the evening; consequently (if the evening be clear) very visible to the sight the whole night, and easily distinguished, being a star of the first magnitude, appearing larger, and shining with greater splendor than any star in the whole heavens. About the middle of February it will rise when the sun sets. But, when speaking of these influences, we do not mean to blend our ideas with the jargon of judicial astrology, which pretends to foretel moral events, such as have a dependence on the free will and agency of man, as if they were directed by the stars. This art, which owed its origin to the practice of knavery on credulity, is now universally exploded by the intelligent part of mankind. But the right predicting of natural effects, as, changes of weather, winds, storms, hurricanes, thunder, floods, earthquakes, &c. this art more properly belongs to
 physiology,

physiology, or natural philosophy, and are only to be deduced from phenomena, observations of influences, &c. We shall only add, that the influences of the planets upon the earth, air, and human bodies, may be accounted for on just and rational principles, although predicting the EXACT time of their effect must ever be liable to error. But thoroughly to investigate this important subject would exceed the limits of this small work, otherwise we might mention that curious and wonderful attraction which influences the Trade Winds, as also the Magnetic Needle or Loadstone.

But we can now only observe two remarkable properties of the air, which merit particular attention, that is, its delicacy and aptness to receive from the slightest impresson.—It is thro' this sensitive medium that all influences must pass to us.—The other property is, its Great Power,

Power, for it will destroy iron, copper, &c. sometimes dissolves and attenuates by its pressure and attraction, and acts different, according to the various influences of the atmosphere and the peculiar ingredients which are impressed into it from planets or other agents of different temperature, which bring many quiescent bodies in the air into action, exciting their latent powers, and causing the various phenomena we experience: Thus, if an acid vapour be diffused through the air, all the bodies of which, that is, the proper menstruum being dissolved by it, are brought into a state proper for action. (Chymistry will furnish us with many instances.) Salt feels the influence of the air, and is at times, liquified by it; even iron and copper dissolve before it, by becoming a rust. Boerhaave assures us that he has seen pillars of iron so much reduced by the influence of the air, that they might be crumbled

crumbled into dust between the fingers. Copper is converted by the air into a substance much like verdigrease produced by vinegar. Even all stones cannot resist some influences of the air: Thus, Purbeck stone, of which Salisbury cathedral consists is observed gradually to become softer, and to moulder away in the air. The changes of the air from wet to dry, heat to cold, &c. are not to be attributed merely to its mechanical properties, such as gravity, density, &c. but to the ingredients that either influence or compose it. At Fashlun, in Sweden, noted for copper mines, the mineral exhalations influence the air in such a manner as to discolour silver coin in purses; and the same effluvia will change the colour of brass. In Camiola and Campania, where are mines of sulphur, the air is so impregnated and influenced with it as to render it very unwholesome, and frequently occasion epidemic diseases.

Air

Air and earth are also influenced by the seasons of the year. From the winter solstice to the summer solstice, the sun's rays become more and more perpendicular, and consequently their impulse on the earth's surface more powerful*; so that the glebe or soil is more and more relaxed, softened, and purified, till he arrives at the tropic, where, with the force of a chymical agent, he resolves the superficial parts of the earth into their constituent principles, water, oil, salt, &c. the essences of vegetation, which are all swept away into the atmosphere, and returned to us in due portions, at the will of the Great Di-

* The sun-flower, and many others, give ocular proof of the sun's influence on them: Thus, the daisy faces the sun at rising, and turns with the sun to its setting. It expands when the sun is on the meridian, and closes when the sun sets at eve.

rector,

rector, whose goodness dispenses those necessary aids which vegetation requires, and who is the Great First Cause of every influence that either tends to advantage or punish the inhabitants of this globe.

C H A P. V.

OF the SOLAR SYSTEM, agreeable to the Principles of Sir ISAAC NEWTON.

THE earth we live upon has been generally thought to be the center of the universe, and to be fixed and immoveable. Pythagoras, indeed, among the ancients, taught the contrary; but his opinion, for want of being thoroughly canvassed by learned and ingenious men, grew into disrepute, and was for many centuries totally neglected. About 250 years

years ago, it was revived by Copernicus, a native of Thorn, in Prussia; and has since, by our great Newton, been established on such clear and solid principles, that it is now universally received.

According to this system, the sun is placed in the center, from whence it never moves; though, from some observations made on its spots, it is found to turn round on its own axis, from west to east, in about 25 days. Round him, at unequal distances six opaque spherical bodies continually revolve. These are called primary planets. That which is nearest to the sun is called Mercury; the next Venus; then our Earth; the next beyond is Mars; after him Jupiter, and the most distant of all is Saturn. Saturn, Jupiter, and Mars, are called superior planets, because their circuits are beyond the Earth's orbit; Mercury and Venus

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are called inferior planets, because their circuits are within that orbit.

Besides these, are discovered in this system, ten other bodies, which move about some of these primary planets, in the same manner as they move round the sun. They are called secondary planets. The most conspicuous of them is the moon, which moves round our earth; four move in like manner round Jupiter, and five round Saturn.

The same planet is not always equally distant from the Sun; because each of the primary planets move round the sun in a line, which forms an ellipsis or oval.

From a round calculation, the DISTANCE of each planet from the sun, and their DIAMETERS, are nearly as follow;

[Distance.

Distance.		Diameter.	
Mercury, 32	} mill. of miles.	2,460	} miles.
Venus, 59		7,900	
Earth, 76		7,900	
Mars, 123		4,444	
Jupiter, 424		81,200	
Saturn, 777		67,900	
Sun,		764,300	
Moon,		2,175	

The distance of the moon from the earth is about thirty of the earth's diameters, or 240,000 miles. Its proportion to the earth in magnitude is as 5 to 258, that is, it is more than 50 times less than the earth. The sun is about a million of times bigger than the earth.

All these planets, both primary and secondary, being opaque bodies, and receiving all their light from the sun, as well as making their great revolutions round him, are, for these reasons, looked upon as dependents on him, and make

up altogether what is called the solar system.

All these planets move one way, from west to east; and, of the primary planets, the most remote is the longest in finishing its course round the sun. The period of Saturn falls short only sixteen days of 29 years and a half: the period of Jupiter is 12 years, wanting fifty days: the period of Mars is within 43 days of two years: the revolution of the earth is one year: the period of Venus is performed in about 224 days and a half: and of Mercury, in about 88 days.

Such of these bodies as revolve round their own axis perform that revolution in the following times; The Sun, in something more than 25 days; Mars, in one day and forty minutes; the Earth, in 23 hours fifty-six minutes; and Jupiter, in 10 hours; the Moon revolves about her axis

axis in the same time that she makes her course round the earth, which is a month. Mercury and Saturn also revolve round their own axis, as all parts of their surfaces cannot otherwise receive the light and heat of the sun, which, in all probability, are as necessary and convenient to them, as we find them to be to the earth. The certainty of this revolution in the other planets is proved by the appearance and disappearance of certain spots on their surfaces, which rising first on one side or edge of the planet's disk, move by degrees to the middle, and so on till they reach the opposite edge, where they set and disappear; and after they have been hid for about the same space of time that they were visible, they again appear to rise in or near the same place as they did at first.

Of the six primary planets, it hath not been observed that more than three are attended with secondaries, moons, or

satellites, viz. the earth, Jupiter; and Saturn.

The moon is a secondary planet to the earth, and performs her revolution round it in something less than 28 days, at about three diameters of the earth's distance from it, and in the space of a year is carried along with the earth round the sun.---Jupiter has four satellites attending him; the first or innermost of which performs its revolution in about one day 18 hours and a half at a distance from the center of that planet, equal to about 5 semi-diameters and three quarters of Jupiter's body. The next satellite revolves round Jupiter in about 3 days 13 hours and one fifth, at the distance from Jupiter of about 9 of that planet's semi-diameters. The third performs its period nearly in 7 days 3 hours and three quarters, at the distance of about 14 semi-diameters and two fifths. The fourth, which

which is the outermost, makes its period in about 16 days 16 hours and a half, at the distance of about 25 semi-diameters and one third. — Saturn has five satellites attending him, which perform their periods round him as follow: The innermost is distant about 4 and a half of Saturn's semi-diameter, and revolves round him in about one day 21 hours and one third. The next is distant about 5 semi-diameters and three fourths, and makes its period in 2 days 17 hours and two thirds. The third is about 8 semi-diameters distant, and performs its revolution in near 4 days, 12 hours and a half. The fourth is near 18 semi-diameters and a half distant, and moves round Saturn in about 15 days 22 hours and two thirds. The outermost is removed to the distance of 56 semi-diameters, and makes its revolution in about 79 days 7 hours and four fifths.

Far beyond this solar system are placed the fixed stars, at such an immense distance, that the best telescopes represent them as points; these are called fixed stars, because, from all ages they have not been observed to change their situation. Hence, it is usual to denote the place of any of the intermediate celestial bodies, by assigning what part of the sphere of the fixed stars they appear to us to be IN, or more properly UNDER. And accordingly it is usual to distinguish that tract of the sphere of the fixed stars, under which all the planets move, by the asterisms or constellations that lie in that tract; which being fancied to represent several things, are therefore called signs; and because the signs represented by them are most of them animals, hence all this tract is stiled the Zodiac. Now the orbit wherein the earth performs its annual period runs into the very middle of the Zodiac, whence this middle part of the

Zodiac

Zodiac is of special note in astronomy, and is therefore distinguished by a peculiar name, being called the Ecliptic. This, as well as the whole Zodiac, is divided into twelve parts, distinguished by the constellation or sign to which each part was formerly assigned. The nearest of the fixed stars are at least 100,000 times farther from us, than we are from the sun.

Thus our Solar System shews the wonderful harmony of Nature, wherewith the frame and structure of all created beings therein are link'd and knit together, to constitute the great machine of this universe. What is there more invites the mind of man into a proper admiration and reverence for the Almighty Architect, than to observe so many and so great bodies endowed with heavenly light, most beautiful to the eye; and, when contemplated, most delightful to the

the understanding? Their mutual inter-
courses and influences, most regular mo-
tions, their certain and determined cir-
culations, and their returns and periods
settled by Divine law in an admirable
harmony displayed in the immense
power, wisdom, and providence of their
maker?

" These are thy glorious works, Parent
of Good.

Almighty, thine the universal frame,
Thus wondrous fair! Thyself how won-
drous then?

Unspeakable! who sittest above these
heavens

To us invisible, or dimly seen

In these thy lowest works: Yet these
declare

Thy Goodness beyond thought, and pow'r
divine!"

F I N I S.



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